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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SPERTY, ARDEN B

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 06/20/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/695,232

Applicant(s)

NAGAI ET AL.

Examiner

Arden B. Sperty

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 and 28-42 is/are rejected.
- 7) ☒ Claim(s) 26 and 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

2. The abstract of the disclosure is objected to because it exceeds 150 words. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 9-12 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the disclosed compositions, does not reasonably provide enablement for *all* porous compositions, as encompassed by the claims.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9-14, 19 and 41-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 9-12, there is not enough information provided in the claims to ascertain the metes and bounds of protection sought. The claims recite an article having properties and physical characteristics without any accompanying compositional limitations. Claims merely setting forth physical characteristics desired in an article, and not setting forth specific compositions which would meet such characteristics, are invalid as vague, indefinite, and functional since they cover any conceivable combination of ingredients either presently existing or which might be discovered in the future and which would impart desired characteristics.

Regarding claims 9,13-14,19 and 41-42, it is unclear what is meant by a "heat treatment temperature." This is not a conventional term in the art. Is this a sintering temperature?

Regarding claim 10, it is not possible to ascertain the sintering temperature of the mixed conducting oxide of the porous body since the sintering temperature of the dense continuous layer of mixed conducting oxide is not known.

Regarding claims 13-14, it is unclear what is meant by a "densifying temperature." This is not a conventional term in the art. Is this a sintering temperature?

Regarding claim 19, the metes and bounds of the claim are unascertainable because it is unclear what the upper limit is since the applicant recites a range for the upper limit. Examiner suggests that applicant use "1400 C" as the maximum temperature.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-9, 11-17, 23-25 and 40 are rejected under 35 U.S.C. 102(a) as being anticipated by USPN 5,964,922 to Keskar et al.

Regarding claim 1, Keskar discloses a ceramic composition as a mixed conducting oxide in perovskite structure, said composition being expressed by the following general formula:

$(\text{Ln}_{1-a}\text{A}_a)(\text{B}_x\text{B}'_y\text{B}''_z)\text{O}_{(3-\delta)}$ wherein $\text{Ln}=\text{La}$, $\text{A}=\text{Sr}$, $\text{B}=\text{Co}$ and Fe , $\text{B}'=\text{Ta}$ and $z=0$ (col 9, line 39; col 10, lines 47-49).

Regarding claim 2, Keskar discloses the composition of claim 1 wherein B contains Fe, the molar number of Co is within the range of 0% to 10% of the molar number of Fe, the sum of the molar numbers of Cr and Ga is 0%. Zn, Li and Mg (B'') are not present since $z=0$.

Regarding claims 3-4, 9, 11-12 and 40, Keskar discloses a composite material comprising a porous body portion comprising a mixed conducting oxide, and a film portion including a gastight dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein the dense continuous layer includes a ceramic composition in perovskite structure as claimed by applicant (col 10, lines 51-55; col 12, lines 34-36). The maximum heat treatment temperature of claim 9 and the densifying temperature of claim 11 are inherent properties. Regarding claims 12 and 40, Keskar teaches a material according to claims 3, 9 or 11

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wherein the thickness of said dense continuous layer is within the range of 10 μm to 1 mm (col 12, lines 37-39). The reference is silent with respect to the porosity of the porous body however, absent a showing of unexpected results with the claimed porosity no patentable distinction is seen between the claimed porous body and that of the prior art.

Regarding claims 5-8, Keskar discloses the claimed ceramic composition used as an oxygen separator (col 7, lines 37-39; col 9, lines 33-39; col 10, lines 47-48). An oxygen separator is a type of chemical reactor.

Regarding claims 13-14 and 23-25 Keskar discloses a composite material comprising a porous body portion comprising a mixed conducting oxide, and a film portion including a gastight dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein the porous body portion and/or the film portion comprises a ceramic composition in perovskite structure, said composition being expressed by the following general formula: $(\text{Ln}_{1-a}\text{A}_a)(\text{B}_x\text{B}'_y\text{B}''_z)\text{O}_{(3-\delta)}$ wherein $\text{Ln}=\text{La}$, $\text{A}=\text{Sr}$, $\text{B}=\text{Co}$ and Fe , $\text{B}'=\text{Ta}$ and B'' is not present because $z=0$ (col 9, line 39; col 10, lines 47-49). Keskar discloses the composition of claims 13-14 wherein B contains Fe, the molar number of Co is within the range of 0% to 10% of the molar number of Fe and the sum of the molar numbers of Cr and Ga is 0% (col 10, lines 51-55).

Regarding claims 15-16, Keskar discloses a composite material comprising a porous body portion comprising a mixed conducting oxide, and a film portion including a gastight dense continuous layer of a mixed conducting oxide formed on said porous body portion, wherein said porous body portion comprises a mixed conducting oxide expressed by the formula $\text{AFe}_x\text{O}_{(3-\delta)}$

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wherein $0.98 \leq x \leq 1.02$; A represents Sr and δ represents a value which is so determined as to meet charge neutralization charges (col 10, composition 13 wherein $z=0$ and lines 51-55).

Claim 17 is considered a product-by-process claim. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. In the instant case the claim is drawn to a material according to claim 16 comprising a porous body portion of a mixed conducting oxide and a film portion including a dense continuous mixed conducting oxide layer which is formed on said porous body portion. The sintering process is irrelevant.

8. Claims 35 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by USPN 5,820,655 to Gottzmann et al.

Regarding claim 35, Gottzmann discloses a composite material wherein an oxygen exchange layer is formed on a surface of one or either side of an oxide having oxide ion diffusivity, said layer being made of an oxide having its composition different from said oxide having oxide ion diffusivity (col 7, lines 22-28).

Regarding claim 38, Gottzmann discloses a material according to claim 35 wherein said oxygen exchange layer is made of an oxide expressed by the claimed formula (Table I, composition 1).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 18, 20-22, 28-34 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,964,922 to Keskar as applied to claim 16 above, and further in view of USPN 5,820,655 to Gottzmann et al.

Regarding claim 18, Keskar discloses the composite material comprising a film portion and a porous body portion, the porous body portion being of the composition according to claim 16, but does not specifically teach the material according to claim 16 wherein said dense continuous layer is made of a mixed conducting oxide material having its composition different from the mixed conducting oxide composition of the porous body portion. Gottzmann teaches the use of different mixed conducting oxide compositions for an ion transport layer, which is analogous to Keskar's ion transport membrane and applicant's dense continuous layer, and a mixed conducting oxide porous body portion because of enhanced surface exchange kinetics (col 7, lines 22-28). Therefore it would have been obvious to one of ordinary skill in the art to modify the compositions of Keskar so that the composition of the dense continuous ion transport membrane was of a different mixed conducting oxide composition than the porous body portion to enhance surface exchange kinetics.

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Regarding claims 20-22, 28-34 and 39, Keskar discloses the composite material of claims 13-14 and 16 wherein the porous body portion is made of a ceramic of a mixed conducting oxide having the claimed composition. Keskar does not specifically teach the material according to claims 13-14 and 16 wherein said dense continuous layer is made of a mixed conducting oxide material having its composition different from the mixed conducting oxide composition of the porous body portion. With specific regard to claims 20-22 and 39, Gottzmann teaches the use of different mixed conducting oxide compositions for an ion transport layer, which is analogous to Keskar's ion transport membrane and applicant's dense continuous layer, and a mixed conducting oxide porous body portion because of enhanced surface exchange kinetics (col 7, lines 22-28). Therefore, it would have been obvious to one of ordinary skill in the art to modify the compositions of Keskar so that the composition of the dense continuous ion transport membrane was different from that of the porous body portion, because of the enhanced surface exchange kinetics. With specific regard to claims 28-34, the compositions suitable for use as Gottzmann's dense continuous layer are those in Table I including the compositions of claims 28 (Table I, composition 10), 30 (Table I, composition 1 wherein $y=0$), 31 (Table I, composition 1 wherein $x=1$), 32 (Table I, composition 10 wherein $x=1$ and $M=Fe$), 33 (Table I, composition 1 wherein $x=1$ and column 8, line 40) and 34 (Table I, composition 10 wherein $x=1$ and column 8, line 40).

11. Claims 36-37 and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,820,655 to Gottzmann et al as applied to claim 35 above, and further in view of USPN 5,964,922 to Keskar et al.

Regarding claims 36-37, Gottzmann discloses the composite material of claim 35, wherein said oxygen exchange layer comprises a dense film, which is analogous to Gottzmann's ion transport membrane (col 7, lines 14-28). Gottzmann is silent with respect to the thickness of the dense film. Keskar teaches that it is common in the art to form an ion transport membrane with a thickness of less than 100 μm , which is certainly less than 300 μm in claim 37 and also covers the thickness of less than 30 μm in claim 36 (col 12, lines 35-40 and 49-51). Furthermore, Keskar teaches that the film thickness is an optimizable variable and is dependent upon the particular application being exercised, and thus is not patentable. It would have been obvious to one of ordinary skill in the art to optimize the film thickness within the claimed ranges to a thickness best suited for the particular application.

Regarding claims 41-42, Gottzmann discloses an oxygen separator, which is a chemical reactor, including a composite material comprising a porous body portion comprising a mixed conducting oxide, and a film portion including a gastight dense continuous layer of a mixed conducting oxide formed on said porous body (col 7, lines 7-28). The maximum heat treatment temperature is an inherent property and thus is not deemed patentable.

Allowable Subject Matter

12. Claims 26-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter: Neither Keskar nor Gottzmann disclose the use of Nb in a dense continuous layer or a porous body. While both references disclose the use of Ta, the references do not specifically disclose a

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material in which the sum of the molar numbers of Ta for the dense continuous layer is smaller than that for the porous body.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arden B. Sperty whose telephone number is 703-305-3143. The examiner can normally be reached on M-R, 08:00-16:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 703-308-3822. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



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June 17, 2002



DEBORAH JONES
SUPERVISORY PATENT EXAMINER